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The semantics of space: exploring semantic grounding in the right posterior parietal cortex

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This study examines the evolving perspective on semantic processing, which has shifted from the traditional view of an isolated semantic memory system to one that recognizes the involvement of distributed modality-specific neural networks. In this context, this study focuses on the posterior parietal cortices (PPCs), known to be involved in visuospatial processing, and their role in processing space-related semantics. To this aim, we utilized low-frequency repetitive Transcranial Magnetic Stimulation (rTMS), a safe technique able to produce focal, transient disruption of cortical function in normal humans during the performance of cognitive tasks. Because of its ability to induce a localized 'reversible lesion', TMS can be used to establishing the role of a particular brain region in a specific behavioural accomplishment. In our experiment we used rTMS targeting the PPCs delivered immediately before two cognitive tasks. The first task required participants to read aloud words from various semantic categories, including those related to space, while the second task entails responding aloud in a dichotomous manner to a question that either involves spatial relations or does not. Despite the first task results not yielding significant findings related to our hypothesis, the outcomes of the second task, and particularly the increased reaction times when spatial terms were used within sentences to establish spatial relationships, shed light on the multifaceted functions of the right posterior parietal cortex, highlighting its potential role in the semantic processing of space-related words. This finding provides insight into the distributed nature of semantic networks and the specialized contributions of modality-specific areas.

